

# Rehabilitation of Patients with Hemiplegia

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## SUMMARY

*Many patients with hemiplegia can be rehabilitated. Physiological reflexes may be used in attempting to establish patterns of motion and are of definite aid in overcoming contractures. Physical and occupational therapy is of value.*

**P**ATIENTS with hemiplegia can be rehabilitated unless one or another of the following conditions exists: Senility, medical complications prohibiting activity, loss of learning ability, psychosis, lack of motivation, and (sometimes) atonicity.

In senile patients the protoplasm cannot meet the requirements of active existence and the organic structures of the body are worn out. The weakness of senility must be differentiated from atrophy of disuse, which can occur at any age and is correctable by exercise. The physiological age must not be confused with the chronological age. It is not uncommon to observe one patient who is 70 years of age to be physiologically younger than another who is 65 years old. Therefore, if the individual is physiologically capable, the chronological age is of no importance in relation to rehabilitation.

Medical conditions prohibiting rehabilitation include active intracranial bleeding and acute heart failure. Chronic heart failure is not a contraindication, providing activity is maintained within the limitations of cardiac compensation.

Loss of learning ability is the commonest stumbling-block encountered in patients who do not respond to rehabilitation efforts. The status of this particular faculty may be determined by psychological testing. By a variety of tests, the ability to remember may be conclusively established.<sup>6</sup> If the testing results are equivocal, therapeutic trial is indicated. Aphasia must not be mistaken for loss of learning ability. The aphasic patient may have an interruption in sensory reception or motor expression without any interference with memory centers.

Motivation is the keystone of rehabilitation. It is of two main types, (1) internal, and (2) external.<sup>7</sup> In internal motivation the impetus to activity arises from within the individual; in external motivation the impetus is provided from the outside. Internal motivation is frequently lost in chronic debilitating illnesses. In order to renew it, external motivation must be supplied as a stimulus. This is accomplished

by demonstrating to the patient that he is capable of performing a movement which he did not consider possible. The realization that motion is possible serves as a stimulus to internal motivation.

Atonicity or flaccidity may be a barrier to rehabilitation. In many cases, however, the patient may be made ambulatory with the aid of a long leg brace.

Rehabilitation is started as soon as medical condition warrants. In cases in which paralysis has been caused by cerebral hemorrhage, activity must wait until all evidence of bleeding ceases. Patients who have had cerebral embolism or thrombosis can be started on treatment within 48 to 96 hours. Initially, atonicity is usually present. This pseudo-flaccid stage later changes to a spastic stage. The muscles on the involved side begin to atrophy immediately as the result of disuse. The involved muscles will respond, by contraction, to electrical stimulation. Electrical stimulation can delay atrophy even in muscles in which peripheral nerves have been severed.<sup>3, 5</sup> Therefore, to minimize atrophy of disuse, the paretic muscles are electrically stimulated. In the later stages when hypertonicity appears, and with it some degree of voluntary motion, electrical stimulation is no longer indicated. The patient is then capable of performing some degree of voluntary effort.

During the atonic phase, it is important to maintain the range of motion in the joints. Contractures are liable to develop, particularly in older individuals. The most common site of contracture is the shoulder. Contracture of the ankle in plantar flexion, while relatively common, is more apparent than real. This will be dealt with in greater detail later. At this stage, motility is maintained by passively moving each joint through a complete range of motion. This procedure is performed at least once a day.

Teaching the patient the activities of daily living<sup>2</sup> is started at the onset of treatment. These activities consist of functions which are inherent in everyday existence, such as getting out of bed, standing, dressing, eating, and walking.

With the return of tone in the involved muscles, there is also some return of voluntary motion. The amount of voluntary motion is variable and depends on the site and size of the cerebral lesion. It has been pointed out<sup>9</sup> that the loss of willed movements is in proportion to the failure of the activating influence of the receptors to reach the motor mechanism through the pyramidal tract. Thus the long-lasting movements which are dependent upon sensory guidance suffer most. The arm suffers more than the leg, and the hand more than the arm. Furthermore, there seems to be a direct relation be-

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tween the degree of loss of voluntary movement and the degree of hypertonus. The greater the tonicity, the less the willed movement.

Hypertonicity in the legs affects the extensor muscles so that the knee is held extended and the foot is plantar-flexed and inverted. When the patient tries to walk there is an apparent foot drop, which prevents the leg's being carried through during the step. As a result the patient elevates the pelvis and tends to abduct the leg on the affected side while walking. A short leg brace with a 90° ankle stop is a definite aid in counteracting these effects. Patients with mild ankle clonus need only a light spring brace. If the clonus is more severe, a double bar brace is necessary.

There are several methods of training the step. One consists of applying pressure over the knee of the seated patient as he attempts to flex his hip. This stimulates the stretch reflex. Another method, for patients incapable of voluntary hip flexion, is the application of painful stimulus such as may be caused by bending down the toe.<sup>4</sup> The reaction is really a withdrawal reflex in response to a painful stimulus, as was shown by Sherrington on decerebrate animals. Kabat<sup>8</sup> expressed the belief that a pattern of motion may be established by constant repetition. When either the stretch or the withdrawal reflex is elicited, the hip, the knee and the ankle dorsiflex, and the foot everts. Apparent plantar flexion ankle contracture will disappear. In those cases in which true ankle contracture exists, reflex action may be used as an aid in stretching the contracture.

Parallel bars may be used in teaching ambulation. The patient first learns to stand and then to walk. Bars are better for this purpose than walkers, since they give the patient a sense of security in that he has something stable to grasp. From the bars the patient is graduated to a cane and finally may be able to walk without support.

Paresis of the arm is more difficult to overcome. Nevertheless good functional recovery as a result of overcoming atrophy of disuse is not uncommon. The tonic neck reflex (turning the head toward the involved side) may be used to aid in activation of the arm. It has been demonstrated that the strength of forward flexion and elbow extension can be increased by over 300 per cent when the tonic neck reflex is used to reinforce voluntary motion. In addition, strength in the arm can be further increased by as much as 200 per cent by overcoming atrophy of disuse in the course of treatment.<sup>10</sup>

The so-called "frozen shoulder," which not only interferes with the range of motion of the arm but is also a source of pain, may be treated by Mennel manipulations and by passive stretching. If the tonic neck reflex is utilized during the treatment of the frozen shoulder, an increase of 10° to 20° of forward flexion, abduction and external rotation may be obtained on passive movement. If the tonic neck reflex is neglected during stretching, the spasticity tending to produce adduction and internal rotation remains to be overcome. The range of motion attained may be maintained by pulley exercises. Here again the tonic neck reflex is of definite aid.

Occupational therapy procedures, which have the advantage of keeping the patient interested in improvement, are best suited to treatment of the arm. Functional treatment by occupational exercise should be started with the arm at shoulder level.<sup>1, 11</sup> The arm may be supported either on a table or by a sling suspension. Resistance is added as tolerated. With increase in strength, the support may be lowered so that work is done at a lower level, and ultimately the support may be removed. Then working position of the unsupported arm may be gradually raised so that it has to be held against gravity.

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